Laboratory Notebook, Cat. 1175

This notebook covers the period November 1873 - July 1874. The laboratory notes and drawings are by Edison and Charles Batchelor. They deal primarily with automatic, printing, and chemical telegraphy; batteries; and general electrical experiments. There are also notes on the electromotograph. At the beginning of the book is a list of hours worked by the employees of the firm of Edison & Unger, probably for 1871. The front cover is labeled "Volume 7." On many of the pages there are faint page/volume numbers similar to those used in Unbound Notebooks, volumes 8-18. The book contains 219 numbered pages.

Missing pages: 1-80.

Cat. 11958

1873?

	No.	Name	Jan 11	12	13	14	15	16	18	20	21	22
Bone [illegible]	1	Ritter	7-1	7 1	7-1	7-5-1	7-1	7-1	7-50-1	7-1	7-1	7-1
	2	Bergmann	7-1	7 1	7-1	7-1	7-1	7-1	7-50/7	7-10/1	7-1	7-1
	3	Prince			7-1	7-1	7-5-1	7-1				
	4	Wagoner	7-1	7 1	7-10-1	7-10-1	7-35-1	7-10-1	7-5/1	7-30/1	7-5/7	7-1
	5	Heyse	7-1	7 1	7-10-1	7-10-1	7-10-1	7-10-1	7-5/7	7-5/1	7-5/1	7-1
	6	Leale			7-1-16	7-1	7-1	7-1	7-30	7/1	7/1	7-1
	7	Liebstaltz	7-1		7-1	7-10-1	7-1	7-30-1	7/1	7/1	7-1	7-1
	8	Wendellees	7-1	Work Rec.						7-1	7-1	7-1
	9	Schreckel	7-1	7 7	7-1	7-1	7-1	7-1	7-5/1	7/7	7-1	7-1
	10	Fuller	7 1	1 1-15	7-1-10	7-10-15	7-5-15	7-1-5	7/1-5	7/7	7-5/1	7-1
	11	[illegible]	7-1	7 7	7-10-1	7-1	7-1	7-5-1	7/7	7/7	7/7	7-1
	12	Ehrlich	7-1	Face Work	7-10-1	7-10-1	7-10-1	7-15-1	7/7	7-5/1	7/7	7-1
	13											
	14	Burkhard	7-10-1	7-10-1	7-1	7-1-5	7-1-5	7-1	7/7	7/1-5	7-1	7-1
	15											
	16	Fricke	7-1	7 1	7-1	7-1	7-1	7-10-1	7/1	7/7	7-1	7-1
	17	Hildebrand	7-1	7 1	7-10						7-1	7-1
	18	E.										
	19	Anna Davis										
	20	Mary Theno										
	21		7 1	7 1	7-10-1	7-1	7-1	7-6-1	7-5/1	7/1	7	
	22	Friedrich	7 1	7 1	7-15-1	7-10-1	7-10-1	7-15-1	7-5/1	7-5/1	7-1	7-1
	23	Cattermann	7-1	7-1	7-10-1	7-1	7-25-1	7-16-1	7-5/1	7-10/1	7-1	7-10/1
	24	George Wagner	7 1	7-1	7-1	7-1	7-1	7-1	7/1	7/1	7-1	7-1
	25	Richard Jacob			2	7-1-10	7-1	7-1	7-20/1-10	7-1	7-1	7-1
	26	Richard Kuttner					7-10-1	7-20-1			1	7-1
	27	John Ott										7/1
	28											
	29											
	30											
	31											
	32											
	33											
	34											
	35											
	36											
	37											

No.	Name	23	24	26	27	28	29	30	July 1st
1	Ritter	7-1	7/7	7/7	7/7	7-1	7-1		7-1
2	Bergmann	7/7	7/7	7/7	7/7	7-1	7-10-1		7-1
3	Prince		7/7						
4	Wagoner	7/7	7/7	7/7	7/7		7-35/1		7-1
5	Heyse	7/7	7/7	7/7	7/7	7-1	7-1		7-1
6	Leale	7/7	7/7	7/7	7/7	7-1	7-1		7-1
7	Liebstaltz	7/7	7/7	7/1	7-30/1	7-1	7-1		7-1
8	Wendellees	7-5/1	7/7	0	0/0	0-1	7-20-1		7-10-1
9	Schreckel	7/7	7/7	7-30/0	0/0	0	7-20-1		7-15-1
10	Fuller	7-5/1	7/7-5	7/1-5	7-5/1-5	7/1-10	7-5-1-10		7-1-10
11	[illegible]	7-5/1	7-5/1	7/1-5	7-5/1	7-5/1	7-1		7-1
12	Ehrlich		7/7			10/1	7		7-1
13	Osborne		7/7				7-1		7-1
14	Burkhard	7	7/7	7/1-5	7/7	7/7	7-1		7-1-5
15			7						
16	Fricke	7	7/7	7-40/1	7/7	7/7	7-1		7-1
17	Hildebrand		7/7	7/1	7/7	7/7	7-1		7-1
18	E.	7							
19	Anna Davis								
20	Mary Theno								
21									
22	Friedrich	7	7						
23	George Wagner		7/7	7/1	7/7	7/7	7-1		7-1
24	Richard Jacob	7	7	0/1	7/7	7/7	7-13-10		7-1
25			7-0	10-10/1	7/7				
26	John Ott	7	7/7	7-5/1	7-5/1	7	7-1		7-5-1
27	Otto	7	7-10						

July	6	7	8	9	10	11	12	13	14	15	16	17
Ritter	7	7-1			7	7-1	7-1	7-1	7-1		7	7
Bugmann		7-1			7	7-1	7-1	7-1	2-50		7	7
					7							
Wagner		7-20			7	3-50	7-1	7-1			7	
Treue	7	7-1				7	7	7	2-50 7		7	7
Leake	7	7										
Celestino	7	7-1			7	8-50	7-1	7-1	7-1		7	7
Wendlber	7	7-20 7-1			7-20	7	7					
Schnabel	7	7-50 7			7-20	7-20	7-10 7-10	7-40	2-50		7	7
						7	7-10	7				
	7	7 7-10							2-20			
Hassmann	7	7-1			2 1-50	7	1-10 1-10	1-1	2 1		7	7
Schwarz		7-1				7-1						
Buchheit		7-50 7			2 1-50		7	7-1	7 1		7	7
Osborne	7	7			7	7	7-1	7-1	2-10 7			
Hill	7	7-10 7			7	7	7-1	7-1	2 7			
Hellmann					7	7 7	7-1	7	2 7		7	7
Hill												
Wagner												
Hill												
Ritzeff		7										
Cameron					2-50		7-1		2-50 7		7	
Gravel	7-10	7			1-50	7	7-1	7-1	7-1		7	7
George Wagner	7	7			7	7	7-1	7-1	7-1		7	7
John Leake	7	7			7	7	7-1	7-1	7-1		7	7
Lakow						7	7	7-1			7	
Smith											7	
Schmidt											7	

July	18	19	20
Ritter	7	Ritter	7 7
Bugmann	7	Bugmann	7 7
		Lakow	7 7
Wagner	7	Wagner	7 7
Treue	7	Treue	7 7
Celestino	7	Celestino	7 7
Wendlber	7	Wendlber	7 7
Schnabel		Schnabel	7 7
		Hassmann	7 7
Hassmann	7	Hassmann	7 7
Schwarz		Schwarz	7 7
Buchheit	7	Buchheit	7 7
Osborne		Osborne	
Hill	7	Hill	7 7
Hellmann	7	Hellmann	7 7
Hill		Hill	
Wagner		Wagner	
Hill		Hill	
Ritzeff			
Cameron	7	Cameron	7 7
Gravel	7	Gravel	7 7
George Wagner	7	George Wagner	7 7
John Leake	7	John Leake	7
Lakow	7		
Smith	7		
Schmidt	7		

1 Positive & Negative electricity. –

If a glass tube, being well dried, be briskly rubbed with a dry woollen cloth the following facts may be produced:–

The tube being presented to certain light substances such as feather, metallic leaf, bits of light paper, minced cloth or pith of elder, will attract them.

If the friction take place in the dark, a faint light will be seen to follow the motions of the cloth.

If the glass be presented to a metallic body, or to the knuckle of the finger, a common spark accompanied by a slight sound, will pass between the glass & the inner.

On removing the glass, no spark, or sensation will be produced, in that which is left when we touch it afterwards.

The same effects will be produced by the cloth with which the glass is rubbed, as by the glass itself.

Fig. 1

An apparatus is made consisting of a small rod A B of about one inch in diameter, from pith of elder, suspended by a fine silken thread to a cardinal stand.

If the glass tube B, after being rubbed, be brought in contact successively with a few balls thus suspended, & then & hands from them a lively will be imparted to the balls, in neither of which there will be required by the glass tube when it is brought near them & they will in like manner repel each other when brought into proximity.

If the hand which holds the cloth be covered with a dry kid glove, no effect after the friction with the glass will shew the same effects. If it be brought in contact with the balls & then separated from them, it will repel them & the balls themselves will repel each other.

It appears therefore that by the friction the electric fluid at the same time developed on the cloth & the glass.

Fig. 2

After friction we cause to be brought into contact with one ball B, fig. 2, & the cloth, with the other B', when effects will be observed. The glass when presented to the ball

& will attract it. & the cloth presented to the ball B will attract it. & the balls will attract each other. It follows therefore, that the electricity developed by friction in the cloth differs from that on the glass, inasmuch as instead of being characterized by repulsion, it is in this as mutually attractive.

The supposition that electrical effects are due to a peculiar substance has taken the name of the electric fluid. Some philosophers, following the Franklinian school in the collection of Franklin have supposed: (a) that there is only a single electric fluid, the particles of which mutually repel each other, but attract those of material bodies; (b) that this fluid is present more or less in all bodies in their natural state; & (c) that when any body contains either more or less than its natural share of electric fluid, the excess or deficiency causes the body to possess powers peculiar, which are collectively expressed by saying, that it is electrified.

On this view, it is supposed that when a piece of glass is rubbed with a woollen cloth, the cloth loses part of its natural share of electricity, & thus becomes electrified negatively or by deficiency: while the electricity which the cloth has lost is accumulated on the glass, which therefore becomes electrified positively or by excess.

The pith ball B, (fig.) coupled by the glass, receives the positive fluid from it & the pith ball B, touched by the cloth, receives the negative fluid from it.

Since the contrary electricities are mutually attractive the balls B & B in this case attract each other. & since like electricities are mutually repulsive the glass ball repels the ball B & the cloth repels the ball B.

Of all known substances a cork ball is the most sensitive of positive & perhaps given either of negative. Between these extreme substances there might be so arranged that any substance in the list being rubbed upon any other that which holds the higher place will be positively, & that which holds the lower negatively electrified. One list is as follows:

1	Fur of cat	6	Glass	11	Sealing Wax
2	Flannel	7	Cotton	12	Amber
3	Ivory	8	White silk	13	Sulphur
4	Rock Crystal	9	The dry hand	14	Cocoistshoue
5	Wool	10	Wood	15	Gun cotton

2 Method of producing electricity by glass & silk with amalgram:—

Experience has proved that the most efficient means of developing electricity on great quantity & intensity is by the friction of glass upon a surface of silk or leather smeared with an amalgam composed of tin (2) zinc (1) & mercury (4 parts) mixed with some unctuous matter. Let some fine chalk be sprinkled on the surface of a wooden cup into which the mercury should be poured hot. Let the zinc & tin melted together be then poured in, & the lid being closed & well shaken, the amalgam may be allowed to cool, & to be finely pulverized in a mortar, & being mixed with unctuous matter may be applied to the rubber.

3 Degrees of Conduction:—

Of all bodies the most perfect conductor are the metals. These bodies transmit electricity instantaneously, & without any sensible obstruction, provided their dimensions are not too small in relation to the quantity of electricity imparted to them.

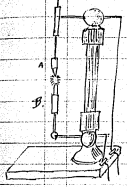
The bodies named in the following series possess the conducting & non-conducting property in a greater or less degree:—

Conductors	Non conductors
All Metals	Gum lac
Well burned charcoal	Amber
Plumbago	Resine

Conductors	Non-conductors
Concentrated Acids	Sulphur
Powdered charcoal	Wax
Dilute acids	Oil
Saline solutions	Glass
Metallic ores	Air & Gases
Animal fluids	Black
Sea water	Diamond
Spring water	Transparent gems
Rain water	Raw silk
Ice above 13° Far.	Bleached silk
Snow	Ivory
Living vegetables	Wool
Living animals	Hair
Flame	Feathers
Smoke	Dry paper
Steam	Parchment
Silk soluble in water	Leather
Rarefied air	Dry gases & air
Vapour of Alcohol	Baked wood
Vapour of Ether	Dry wax, Sealing wax
Moist earth & stones	Porcelain
Powdered glass	Dry marble
Flowers of sulphur	Lime, silica & magnesia, Zirconia, Carbon, Lead, Strontia, Lycopodium, Palmic carbonate of Baryta, Dry chalk, Lime, Phosphorus, Ice below 13° Far. Many transparent crystals, dry, Ashes of animal bodies, " " vegetable, Gets the blames the best, Dry metallic oxides

H. Electric Light

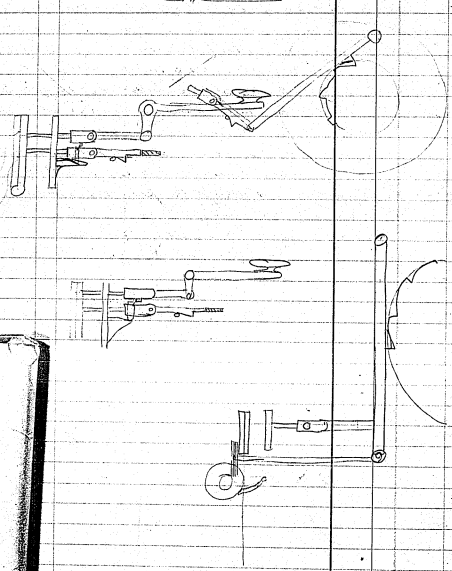
Of all the luminous effects produced by the agency of electricity, by far the most splendid is the light produced by the passage of the current, proceeding from a powerful battery, between two points of charcoal, pointed point to point. The charcoal being an imperfect conductor is rendered incandescent by the current & being incapable of any temperature hitherto attained, the degree of splendour of which it incandescence is susceptible has no other practical limit except the power of the battery.



S

Automatic

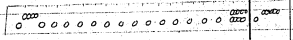
Device for Transmitting Strips for Automatic Transmission for Stock Printer



Automatic

The strip of paper for transmission must be perforated by 2 punches one for printing lever & the other for Escapement & as the unit work on open & closed circuit the strip must be perforated after the manner of the transmitter:

now if this strip is put on a drum & a roller pen running over it is connected with the escapement of a stock printer it will work the type wheel round, but now in order to print you have to have a perforator which punches a hole directly above or directly below of escapement, the other & introduce another roller pen in transmission connected with pty bow magnet & put as if you want to print BAD your perforated strip will look like this



Nov 18/73

1. See what effect a strong magnet has on
B. Copper. Nickel

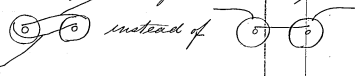
2. Make 2 magnetic needles thus:-
B. ——— & & suspend one with a thread
& see what effect the other has on it.

3. Take a magnetic needle & place it on a cork in
B. a dish of water see if it points north.
Now put a current from a strong battery in it
& see what effect

4. Find out what this means: Magnetic attraction
B. & repulsions are inversely as the square of the distance.

5. See whether the pole of a gravity battery give off
B. hydrogen & oxygen or not

6. See how much resistance is lost in
B. connecting a magnet this way:

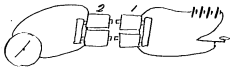


instead of

A current of electricity passing near a magnetic needle deflects it.

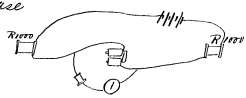
yes

7 See how much induction there is from
B a magnet of a given size on another
the same size when they are touching
& different distances away.



8 Shunt No 1 Magnet
B " No 2 "
" both a " & note induction

9 Examine well the backchange in this
B case



10 Connect a wire to Zinc grounded in yard
B & 1 to gas pipe & see if you get a current

11 Decompose Iodide of Potassium with electricity
B

11 5 cup Carbon.
Hydrogen bubbles from Neg. pole
Oxygen combines with K.O. & the Iodine is set
free settling to bottom in deep cloudy state colour
of Pot water.

Cur

12 Chemical paper.
13 Hydrosulphuric Acid } Iron pen
Cyanuret of Pot.

13 Ferrid Sol.
13 Hydrosulphuric Acid } Iron pen

14 Ferrid Sol.
13 Hydrosulphret of Ammonia } Iron pen

15 Antimoniate Potash
13 Chloride Sodium } Iron pen.

16 Antimoniate Pot.
13 Chloride Sodium
1 drop. Hydro Sulph Acid } Iron pen

17 Get resistance of Iodine paper moved
E. 3rd a second & prevent Iodine from insulating the pen See if resistance decreases as battery increases.

18 Make Little Solution & try it
12 Water
4 Sol. Chl Cal.
E. 2 Sat Sol Ferrocyanide Pot
Add Chromic acid till it assumes a cherry color.
Add to part Chl Sodium

Cur

White paper. deep black mark but fades out. not so sensitive as pen

Very light yellow paper. purple mark very broad. permanent. "

White paper. Black mark turns brown permanent

White paper Brown mark pen.

1873.

White paper Brown mark

Little solution is a failure. the worst we have ever thought of & got a mark from it little harsh & makes as good a mark almost without battery as with. It is a light yellow paper & blue mark with iron pen but pen will not mark on platina plate & no other pen will mark on this solution. I can make as mixed mark with my finger nail as I can with pen tried it with success of everything but it is a complete failure

Battery EN

19. Hyposulphiret of Potash — Zinc pen

20 b. Bichloride Mercury, Chloride Sodium — Zinc pen

21 b. Phosphate Soda, Chloride Sodium — Iron pen

22. Nitric Ac.
b. Chlorate Pot.
Sulphocyanide Potassium

23. Make sawdust battery in a large battery
B. pan such as is used w Pt & Carbon
& note deflections

24. See if you can put a charge from Plate electric
into a steel needle magnetized & point north
E. & see if the charge will make the point from
due north also see how near a substance
insulates or not will approach before
throwing it out of its track

23 Oct 29. 12 noon. 25 – 10 – 2 – 0

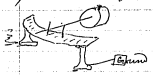
Oct. 30 – 9 a.m.	43	27	5	15	21 K.	
Oct. 31 – 9 a.m.	47	23	9	1	42	
Jan. 2 – 9 p.m.	49	22	24	3	74	
Jan. 6 – 9 p.m.	52½	26	11	12	100	

Battery
Batchelor
50 K.

Ret

Ans

25 See if by any arrangement you can prevent the needle of the Aberdeen Galv.
E from sticking & the points perhaps swelling the ebonite plate which the needle is suspended on will do it



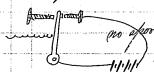
26 Chromic & Permanganic Acid part with their O. with smallest current. It is a great object with sensitive paper to get the largest amount of O liberated from the
E weakest currents as to get the most peroxide, therefore try Chromic & Permanganic acids with & without Chloride Iodium or other substances. If it should spontaneously decompose without current a little, but greater with, there would be a light continuous angle between dots & dashes but if you use fast Cos words, with sensitive paper the spontaneously made photo would not show.

Galvanometry

27/E See if you can arrange inking pad & that the embossed marks on blotter equally

28 Try conductivity of Mercury & Zinc
E amalgam in small hole tube see if it is high & constant

29. Try this:— See if the mere passage of the current from 2 or 3 good cells or more of Carbon bat through the armature lever & plat. pts. will make them stick. I suspect that when the spring is adjusted so as to just pull the lever away from point when no current is on by pushing it up with finger it wont stick but if battery is connected & it is then pushed up it will stick owing to magnetic effect of current on plat. pts. Include a sounder in circuit



29. The stick is very perceptible on.
A cup carbon plating bath, 12 dm sounder, sticking not so great when you substitute resistance for sounder.
Platinum is magnetic & can be so by this means. I suspended a needle of soft iron by a fibre of silk over the points & every time I closed circuit it drew middle of platinum points

Note. Platinum is not magnetic it is the current which passes through it.

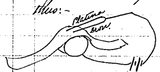
[illegible]

30 You know that when Sulphuret Pot. is used with an Iron pen, the pen becomes polarised thus:—

Transmitted — — —   On closing the

Recorded. — — — —   circuit there is an

E intense black mark on opening it ceases on closing again the mark does not commence for some time. To get rid of this try a double pen iron & Platina thus:-

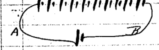


Also try copper, tin Pen. with Iron

31 Put up 10 good Carbons & test each one on No 4 Bradley to get deflection, pick out best one & try & get 9 others that equal it. then connect these 10 to a single cup giving the same deflection connecting the coke of 10 cup battery to the coke of 1 cup & zinc of 10 cup & zinc of 1 cup. take the deflection on 1.2.3+4 of 10 separate & the 1 separate every few hours for 3 days keeping them on closed circuit all time also take deflection all together. I want to see what action will take place in single cell

E

31 Galvan. 27.. Electropoion 34 Beaume.. 4½ fluid oz each



Dec 31st	10 Cups. 1	2	3	4		1 Cup. 1	2	3	4	Resistance of both at A: Zinc of 10 cup to single 1	2	3	4	Zinc of 1 cup 1	2	3	4	Resistance of both at B: Carbon of 10 cup 1	2	3	4	Carbon of 1 cup to single 1	2	3	4	Remarks
Jan 12 M	86	80½	54	10	—	70	67	55	15½	85	79½	49	8	86	87	54	9	86	82	55	11	85½	80	55	11	Jan 2 10 AM: Fluid in 10 cup bat is all black while the fluid in 1 cup seems as pearl as ever.
3 3 PM	86½	83	66	17	—	72	72	78	45	86	82	62	13	87	85	67	14	87	85	69	14	87	82	64	17	
7½ 7 PM	87	85	76	30	—	71½	71½	80	62	67	85	75	35	57½	87	81½	32	87½	87½	81½	30	87	55	75	30	
25 Jan 2 9 AM	81½	78	61½	14	—	74	73½	80	58½	80	76	55	10	75	75	51	7	77	74	51	12	74	67	43	8	
50 10 AM	77	73½	57½	12	—	73	73	80	64	61½	54	29	3½	56	52	28	3	55	48	23	3	52	41½	21	3	
54 2 PM	78	74½	60½	13½	—	72½	72½	80	65	58½	49½	27	3½	52	50½	28	3	64½	59½	33½	3½	58½	50	24½	3½	
59 7 PM	77½	74½	61½	14	—	72½	72½	80	67½	64	58½	36	5	78½	67½	35½	5	63	57½	36	4½	64	58½	35	5	
75 Jan 3 11 AM	77½	74	59	12	—	74	74	81½	68½	64	58½	32½	5½	61	53	33½	4	67½	62½	37½	7½	61½	53	31	4	
81 — 5 PM	77½	74	61	13	—	73	72½	80½	67½	60½	55	30½	5½	61	56	35	4	60½	56	33	3½	63	56½	33	4½	
97 — 4 9 AM	77	73	54½	11	—	74	73½	80	64	57½	46	22½	3	63	56	31½	4	56½	44	24	2	52½	46	22	3.	
121 — 5 9 AM	76½	72	53	10½	—	73	72½	80	63	60½	52	25	4	56	50	24	4	60	50	25	3½	56	50	54½	12	
129 — — 5 PM	76½	72½	54	10	—	69	70	79½	57	59	52	24	3	55	50	25	3	63	55	28	3	58½	52	35	3.	
144 — 6 8 AM	76½	70½	44½	7½	—	71½	72	79½	52	51	44	15	3	54	46	19	2	61	50	20	3	67	52	20	3	
154 — — 6 PM	77	72	50	9	—	74½	73½	80	78	68	56	26	3½	59	56	27	3½	71	59	30	3	61	54	26	3	
169 — 7 — 9 AM	76½	71½	47½	8	—	71	74½	80	58½	55½	45½	18½	2	53	46	17	2	77	50	21	3	57	46	17	1½	
177 — 7.5 — AM	76½	70½	47	8	—	72	73	79	55½	56	45½	17	1	53	46	19	2½	61	52	21	2	55	46	18½	3.	
219 — 9 — 11 AM	71½	62	31	5	—	71	70	76	40	59	36	11	1½	44	33	11	2	55	41	12	1	50	24	12	2	
250 10 6 PM	72½	62	31	4	—	70	67	74	40	54	33	9	3	43	31	9	1	50	36	11	2	39	26	7	½	
289 12 9 AM	68½	55	20	4	—	69	64	59	19	45	29	8	2½	39	23	4	1	53	33	8	0	44	29	8	2	
299 — 7 PM	72½	62	27	4	—	73	73	77	39	39	26	6	½	41	27	13	1	46	31	11	½	42	27	7	½	

Batchelor 110 W

Edison 100.

32 Connect 5 cups Carbon with 5 more opposing each other (10) the carbon of 1 pair connected with the carbon of the other pair. Take deflection of each 5 separate then connect together & take deflection if there is any current pass which battery gives & then change cups so as to get a balance with 1 to 2 degrees on No 4

33 Put 3 good cups all same deflection on No 4 separately on closed circuit in. Add deflection on all coils every few hours add & know how long a Carbon battery will last on short circuit

34 Evaporate different metal solutions on clean Zinc (polished) by heat & note any specific colors for different metals

Effinity of Electrolyte 24° Beaumé in each

Galvanometer 24. Line Bichromate single Resistance 21.

Jan 1 - 9 am. Electrolyte looks as good

Remarks:- Jan new carbon [illegible] a little

Jan 1 9 pm. In testing bad battery together I got a deflection of 5° I disjoined and found No 1 No 2 having a little above resistance

Jan 2 - 7 pm. In testing bad battery get deflection of 18° but it came down to 12° in ½ minute.

Jan 3 - 8 pm. Deflection of bad - 7.25° but soon down to 4°

Jan 4 9 am. Get deflection of 0.75° from 2 Trials & 38 pm. Carbon had run down entirely.

Date	1	2	3	4	1	2	3	4
	Nos 1				2			
Jan 1 9 am	25	23	79	44	25	23	75	41
12 noon	26	23	90	44	26	23	73	47
8 pm	26	23	90	44	26	23	72	47
7 pm	27	23	90	44	26	23	72	44
12 AM	26	23	90	44	25	23	72	44
7 pm	27	23	90	44	25	23	72	44
4 9 AM	27	23	88	43	25	23	71	44
7 9 AM	111	21	90	43	22	20	73	47
7 PM	112	21	90	43	22	20	73	47
8 AM	112	22	90	43	22	20	73	47
3 AM	112	22	90	43	22	20	73	47
3 AM	112	22	90	43	22	20	73	47
2 AM	112	22	90	43	22	20	73	47
2 AM	112	22	90	43	22	20	73	47
2 AM	112	22	90	43	22	20	73	47
9 AM		20	75	50	19	20	71	46
4 PM	24	23	79	49	22	22	72	47
12 9 AM	24	23	79	49	22	22	72	47

Galvanometer 28.

Remarks: Water outside weak only pressure

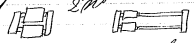
Cap. for battery are better now - has water outside

+ The water which just covered Zinc is now 4 inch under it

Date	1	2	3	4	1	2	3	4	1	2	3	4	Ar.
					2				3				
4	9 am	70	66	70	72	70	67	55	70	101	72	50	
5		70	66	65	7	69	61	55	6	72	65	72	3
6	12 N	70	66	65		70	62	55	6	72	65	72	3
6	3 pm	70	65	72	101	70	62	70	50	101	72	50	6
	Jan 1 9 pm	70	65	70	73	70	62	70	72	72	65	72	70
2	10 am	73	70	65	72	70	62	70	70	57	50	57	70
	2 PM	74	72	66	72	70	62	70	70	57	50	57	70
	7 PM	73	73	67	73	70	62	70	70	57	50	57	70
3	8 AM	73	73	67	73	70	62	70	70	57	50	57	70
	7 AM	73	73	67	73	70	62	70	70	57	50	57	70
	6 PM	73	73	67	73	70	62	70	70	57	50	57	70
4	9 AM	73	73	67	73	70	62	70	70	57	50	57	70
5	9 AM	73	73	67	73	70	62	70	70	57	50	57	70
6	8 AM	73	73	67	73	70	62	70	70	57	50	57	70
	6 PM	73	73	67	73	70	62	70	70	57	50	57	70
7	10 AM	73	73	67	73	70	62	70	70	57	50	57	70
	2 PM	73	73	67	73	70	62	70	70	57	50	57	70
9	11 AM	73	73	67	73	70	62	70	70	57	50	57	70
10	6 PM	73	73	67	73	70	62	70	70	57	50	57	70
12	6 PM	73	73	67	73	70	62	70	70	57	50	57	70

95 Induction:—
See if the extension of the cores by putting 2 extra Iron cores pressing up against those of magnet will increase induction with out adding more wire

Also try this



You can gear up those tables so that
E. transmitter will have to turn quite fast to get a moderate speed on receiving, the speed must be even. in changing from one experiment to another it would be best to keep transmitter going & the pressure of your pen should always be alike probably this would answer

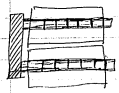
For this experiment wet a whole circle of paper at once as at A above. the paper all alike etc
Note the deflection of tab used on the 4 coil & always keep up to that deflec. Be sure you get bridge resistance correct so not the least current shows on paper even on turning slow. It takes a given amount of resistance to show current on record pen after you can see it on first R. this

Pull out solid core & insert cores of 6 solid wires with regular back & armature see which gives most induction solid or 6 wires.

Edison
Bachelor
Lon

Jan 12 1878
14 Yrs

36 Try this for induction & strength of attraction:



Core to be sawed in lengths of ¼ in & separated by brass so the two parts touch but are too of an piece off

E Have an idea that there will be no induction & attractive strength as great as solid core w. must use same rubber with same battery If this is so we can make long ordinary magnet thereby getting strength & yet have no induction

37 Wind one layer of German silver bare wire on a core of boxwood covered with one layer of soft paper. wind well good tension after bound shellac & dry

E & then test resistance.

Test wire before winding & measure well ends to make each turn just onto the paper & away from its neighbor.

38 Make solution of ¼ oz Ferricyanide Pot & ¼th salt

E crystallize & see what difference

This solution crystallizes at first in beautiful long oblique crystals but on becoming dry & then once to the mixture of salt & is of a greenish yellow hue.

39 By diffusion of different substances between 2 platinum disks. In ascertaining it first place the solutions in glasses of the same size so platinum disks shall fit each. allow them to stand in a quiet place for 24 hrs & note diffusion. The lighter liquid (ether or hydrocarbon) must be put in first, & the heavier is poured into bottom of glass with glass tube very carefully to prevent mechanical diffusion. A mark is then made where the liquids join & a note made as to the sharpness of line etc. The glass is then covered with a piece of writing paper on which has been rubbed beeswax & pressed down on the rim. this will prevent evaporation.
At the end of 24 hours the substance which shows considerable diffusion is taken down & platinum disk placed in it so that the lower disk shall just come to mark previously made on the glass. This is connected to the battery, the lower to the zinc plate & the upper to copper plate. Put aside & note the time & take it being back the two liquids to their original position & note all phenomena.
Make platina disks like this:-

E.

Try:- Molasses & Chromic Acid
" & Chrome Yellow
" & Prussian Blue
Alcohol col. by Saffron &
Deep yellow saturated sol. of Sulphate Zinc

Sulphate Copper & Chl Sodium col. by cochineal.
Protosulphide Iron & Carb. Pot. col.
Water & Lamp Black.
E. Glycerine & Turpentine
Also immerse in 2 dense precipitates
Reverse connections.

40 Arrange a test tube with 2 platinum strips & conduct H. Cl and & test all metals in table A in Bloxam under electric influence & ascertain if the reactions are the same & also use very dilute solutions of metals to be detected & see if the presence of the electric current increases the delicacy also pass a spark constantly onto the solution from the plate glass machine

41 Substitute a magnesium plate in battery in place of zinc & note deflections.
6

42 When magnesium is put in water it liberates pure inodorous hydrogen. Hence associate a Magnesium pen with the Iron pen in reg. Fluid let first before & then after the non one & note the difference.
L

43 Make a third solution of Glue with Lunitate of Soda & hydrochloric acid a compound of Lunitic Acid & Glue is precipitated. At a temperature of 84° & 114° Fah. it is supposedly elastic & admit of being drawn into very thin sheets on cooling it becomes hard & brittle & on being heated is again soft & plastic See if it will do for the Rubber.
B

44 Try this for a more sensitive mirror galvan. By this means we can get a great deal larger torsion.

Ammonia & Battery

46 Make Automatic Glue for Automatic

46 Make battery of sulphate of soda instead of Bichromate & test deflections.

47 Make a battery with plumbago in porous cup & Muriate of ammonia in jar & test deflections

Amm & Battery

45 1 P Fluid of water } dissolve in water bath.
10 ℔ Gum arabic } this is about enough for
½ ℔ Sugar. } 10 pots. & cost about 6 pence.

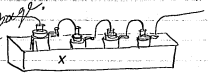
Farrar Co.

1 fluid ℔ water — ½ ℔ of sulphate soda
(1½ Carbon cup.)

	1	2	3	4				
Aug 6 — 8 AM.	50	41	12.5	5½				
7 — 9 PM	40	13	4	7½				
7 — 9 AM	27	23	12	2				
6 PM	15	15	9	½				

Used it in Carbon cell (Plan 90) which it should be sealed in porous cup.

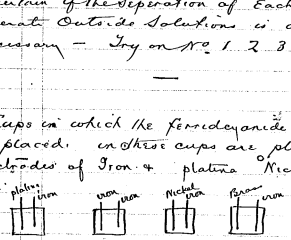
See next page.



X is a trough water tight made so by paraffine in this trough is set 5 zincs with porous cups and Carbons, in the porous cells is the Red Ordinary fluid in the trough is acidulated Water, Take the deflections of these 5 Cups through 5000 ohms, Then take 5 regular Cups and take the deflection through same Resis with Bradley No 1. The object being to ascertain if the seperation of Each Element in Operant Outside Solutions is absolutely necessary — Try on No 1 2 3 4 4. Bolly

—

Cups in which the ferricyanide Regular solution is placed. in these cups are plunged small electrodes of Iron & platina Nickel Brass & Iron.



Connect to Gal No 1 2 3 4 4 get deflections on each cup, have all plates as near same age and distance apart as possible If no deflection on Bradley try Mirror The object being to ascertain if the Iron recording pen in Conjunction with the wet paper and drum of Nickel or other metal forms a cell and generate a Current. If it does it may have sufficient Electromotive force to neutralize a very feeble Current which is sometimes met in Experimenting

Get the deflection of 4 cups Calland used for Local on Washn Wire through 5000 3000 1000 & 500 ohms. then on No 1 2 3 & 4 Cells —

Then take 2 cups Carbon and take the deflection through same resistance and see if the 2 Carbon dont equal the Calland 4 Cups. in the proportion of

100 units for Carbon
56. for Calland.

New Carbon (4)

If 3 cups Carbon are necessary take new set deflections

Then try 1 Carbon Cup on No 1 2 3 4 4 Especially

Then Connect the four Calland for quantity i.e. all the Zincs together and all the Coppers together and take deflections on 1 2 3 4 4 on the Galvanometer —

Select the Carbon Cup out of several as the one which gives the highest deflection on No 4.

12 Volts.

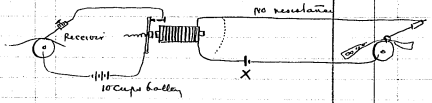
Jan 23 Bradley galvan. 28 Three were left in 21.10 ohms resistance but not taken on ~~5000~~ ohms resistance X.

	4 Cups Battery				Wood box with 4 Lines			
	1	2	3	4	1	2	3	4
Jan 23								
~~2PM~~	~~21~~	~~5~~	~~2~~	~~0~~	~~23~~	~~6~~	~~1~~	~~0~~
Jan 24	~~21~~	~~5~~	~~1~~	~~0~~ ~~12N~~	~~1½~~	~~1½~~	~~1~~	~~1½~~
	89	82	81	51 5PM	89	88	86	63
Jan 25	89	81	81	51 10AM	82	81	81	45

Analyze that red looking stuff that gathers on Copland battery. Suspect Iron & Lead.

Also test some of our Zinc used for batteries for the several Metals.

Ascertain the greatest number of perfect dots that can be recorded on chemical paper from the repeating point of our large relay Tillotson pattern. Thus



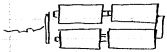
Try with 1 Carbon Cell at X. Then 2 then 4 — 8 — 16 — 32 —
The armature being $\frac{1}{16}$ from Cores, Then Repeat with it $\frac{1}{64}$ — then repeat with it at $\frac{1}{8}$ then $\frac{1}{4}$ —

After these Experiments which should be performed with a Coulomon line of dots and accurate timing not less than 10 seconds. Shunt the relay with twice its own Resistance, the relay ought to be 200 ohms but 100 will do, Then go all over it, be sure on making the first trial to adjust the spring a number of times before pronouncing that to be the highest speed possible —
When you try this Experiment I want to audit —

See page 163.

Then Substitute for Tillotson the Phelps and add outside Resistance so as to Equalize the R of the former relay & Duplicate all the Experiments.
Then try one relay with Shunt off & Duplicate all the Experiments

Then Screw two Tillotson spools together thus



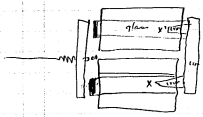
and use as a long relay and Duplicate all Experiments,

Then try one of these little short relays on brass base —

Then Try a Duplex Sounder in place of relay

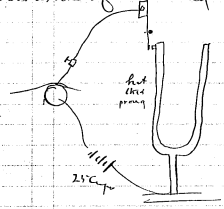
Get a pane of glass wipe perfectly dry and paste two strips tin foil on each end Connect one to Earth other to plate glass Machine, use some highly colored spray between the foils and pass the Current through notice if the particles of spray seperate from each other also pass the 175 small Cups through a thin film of colored wax to from foil to foil see if it dont seperate the moment in two pals until no Current passes

Make an electromagnet the cons of which are glass tubes filled & packed tight with fine Iron (no steel) filings with an Iron back & Iron armature. Close the front ends with sealing wax. Try attraction force & Induction.



points x' x fastened to back and extend in among the filings to form a Magnetic Connection.

To recording on Chemical paper the vibrations of a tuning fork thus



To insulate Copper wire for magnets by forming an insolubble oxide on it –

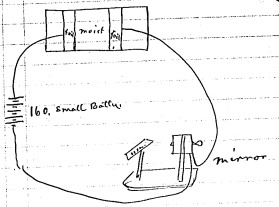
Try this:

Immerse a loosely coiled hank of Copper in a jar containing air inverted over a jar of water into this under water convey oxygen gas by a tube for few seconds, (clean the Copper first). This will oxidize the Copper then gently & carefully withdraw the Copper wire and immerse for an instant in a solution of ~~ferrous~~ ferricyanide of pot. 1 oz to quart water, this will convert the oxide of Copper into the insoluble ferricyanide of Copper and perhaps prussiate insulate & state to the wire,

Take two brightly highly polished pieces 4 inch long of no. 9. iron wire, boil one for 1 hour in oil, do nothing with the other – Now put both in a bottle water separate from each other – leave the bottle ~~app~~ open to allow free access of air & set up on high shelf – for several months I think the oil will prevent one of the wires from rusting.

Jan 22 1844. ~~These two pieces of iron wire~~ were put in a ~~battery jar the one that~~ is cut with a file on end was boiled in ~~lard~~ oil for 1 hour

Mar 31 2 pieces of Washburn wire highly polished the one with 3 rings on end has been boiled in lard oil for 1 hour
2 ~~shorter~~ pieces of 9 wire with the galvanized part filed off 1 with 1 mark on it 1 with 2 marks on the one with 2 marks has been boiled in oil



Moisten glass between foils & take deflection
Even 3 minutes =

Ascertain what is resistance of Toms Body also your own & Brouns with dripping wet hands
See if the deflection is constant for 5 minutes.

Aluminum Sen.
Aluminum Salts have a great affinity for Coloring Matter, forming insolvable pegments

Perhaps a protoxide will be formed in the Electrolysis then if the pepe Contains a fleeting Color from an organic substance or Otherwise and the Prote Combines with it to form an insolvable Color while the Color not under Electrolysis fades

Aluminum Salts have a great affinity for Gelatin perhaps a Gelatinized

4 Cups Carbon.
Jan 21st Zinc 19.570 ohms
Bated 16.900
Finter 16.070

paper might be used and insoluble
Marks (cased) be made produced

Alum changes the Tint of blue petals
of plants to Green
hence the paper be wet with a stable
infusion of some Blue Color. (say red Cabbage
although that aint Blue) or logwood) on
passing the Current a prate would be
formed & change the blue to Green &
perhaps some Chemical having
the action of the Vegetable Color
would be included in the Solution
which Chemical would increase the
Oxidation or perhaps produce an
exchange action & turn the lower
oxide into a higher or form an
Alum or aluminum Salt

Try for Patent purposes

Ferroprussiate Chl Calcium & Sulphuric or
Nitric Muriatic Acids to free the Chlorine
from the Calcium & produce a ferrid

Also - Ferroprussiate. Chl Lime & acids
" " " " all Chlorides & acids named
Chlorates also.

prepare some Cochineal as given in Dicks —
(test for prolosalt iron) & add some Chlorides &
test for delicacy

Patent

Ferroprussiate Chlorinated Lime & slight
amount of Sulphuric Acid, (Muriatic) or Nitric (Yellow) Acid (Yellowish Sen)
Hydrochloric Acid (Muriatic-Sen) Acetic Acid

Ferro-cyanide strong. Strong Sol Chl Calcium
Little Chl Acid - Sol acid until it turns
paper yellow - Little turns it blue - very
sensitive probably greater than ferrid.
Excess of Sulph Ac. no good.

Nickelpen gives brown mark with Excess
ferrid & Chl Sodium nearly as good as Iron

Strong Sol Chl. Calcium & little Nitric Muriatic Ac (left blue) good mark.

.772 = 8/1
.94 = 4/1
.6 = 2/1
0.3.1 = 1

Paper
1 ounce Drachms Dilute Sulphuric Acid,
5 grains Permanganate Potash.
Will probably give white Mark.

Paper 1 oz Sul Soda. 6 pennyw Sul Acid
6 pennyw Sul Copper Coil.
try – if unsatisfactory add a chloride
also to fresh part add Nitrate Amon

Try Little perchl Iron & Cyanide Potassium
to this add So different solutions the
Grand Acids.
The Sul Acid will probably free the
Chlorine from the perchloride Iron
The iron going over to the cyanide to
form ferrocyanide the Chlorine acting
on this forms a ferrid & we obtain a
Sensitive paper perhaps peroxide iron
or Sesqui or even Sul Iron will answer

Try Nitroprusside Sodium – & Salt

Try Nitroprusside Sodium & Chl Sod &
Sul Acid, The Nitropru having a
ferro in it Sul Acid action on Chl
Sod Calcium etc will produce a ferrid

With this white mark not very permanent
obtained with nickel Copp Iron Bismuth
pens probably with prop proportion good
Paper to obtained, paper Coloured intensely
Tarnished Color (red) by bleaching by
Sul Iron – get no mark –

Cyanide Pot & Per Chl Iron from Blue paper

Dont work – strikes good with prussic only

Test starch with Tannin, etc as delicate as Iodine. – Dick pr. 4381

Poison Mushroom Solution – Iron Oxide good yellow – also other metal characteristic colors accordingly.

Aluminum pen Colored paper
Borax & Aqua Ammon White mark

Iron pen Acetic Acid (acetate of zinc with) Blood.
Red Mark in Solution so dilute blood imperceptible

Lead pen – Sulphuret Lime 2 drachm 2 drachms
Tartaric Acid powder mix & shake in a stoppered bottle, with pure water let settle pour off
Clear Liquid & add 1½ oz Tartaric Acid
Black mark – if no mark add little wine sherry – 4402 Try 4403

Hematin from Logwood – Copper pen.
Chloride: Violet Blue color if
Is a fresh part add Acetic Ac.

Solution of Sulph. Manganese
Platinum pen
High tension Bat.
Also Electrical Mac
Ozone: gives Black mark.

Hydrocyanic Ac Iron pen
Sulphuric Ac

Cyanide of Potassium
Sulphuric Ac
Iron Pen.

Mix Gum Arabic 125 parts concentrated
Sulphate Alumina 2 parts.
The proportion of Gum Arabic is 2 of Gum
5 of water.
The sulphate of Alumina is to be dissolved in
10 times its weight water & mixed direct
with gum solution.
Called Vegetable glue.

E.A.P. 15th

Test for Sensitive paper. through 10.0000 hm. with 1 cup carbon

1 Original ferric solution. 1 gal H.O. 7.8 Fe. 7 K. 1 Ser.
2 Iodide of Potassium Sol. 1 gall H.O.
2 lb Iodine Potassium 1 lb Starch.
3 Infusion Logwood, Sulphate Pot. Salt. ——
4 " " Potassium Pot. Salt. —
5 Decoction Logwood.
6 " " & Salt.
7 " " " " & Sulph Ac.
8 " " " & Acetic Ac.
9 " " " " " " more Logwood
10 " " Salt, Acetic Ac, Chl. Iron.

1 Faint blue mark. (perm.) Iron Pen
2 Faint reddish brown mark. (fades of course) Platina Pen
3 No mark with any pen. white paper
4 Dark red paper, no mark.
5 Dark brown paper, black mark with Iron pen & deep brown with copper. both permanent.
6 ditto but not so sensitive
7 No mark
8 Brown paper, ten pen, red mark rather sens.
9 More sensitive the marks are stronger at three ends than in middle thus — — — — —
10 Zinc pen, deep purple mark, dark purple paper.

E.A.M. 12

Guaiacum test for ozone

Dr. Dotet of N.Y. states that strips of paper saturated with tincture of guaiacum afford a more sensitive & certain reagent to test for presence of ozone than either KI & starch or paper containing protoxide of thallium & that such an ozonometer can be relied on & show at least 10 gradations or shades

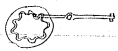
Iodide of Potassium solution
Bismuth pen shows give brown mark
Palladium pen " " black mark
perhaps these are permanent & sensitive

See how many cups of battery it takes & mark on Fritz paper dry perfectly

Make Pouget-Maisonneuve' solution
150 parts Cup. Nitrate Ammonia
5 " Ferro Cyan Pot.
10 " Water
Before using, paper must be moistened with dilute Sulph ac. especially strong for conductive but not & attack metal

Guiacum dissolved by Aqua Ammonia: no water.
Very poor mark with platina only on platina better on iron — Add salt, increases delicacy much
gives blue mark with Copper which is not final
White rapidly turns blue on iron. Iron gives on platina
Deep red or rust colored + on iron better mark
quite delicate something in it. Paper first light
color turn green mark spread slightly
Coke to gen: Zinc to pen no good

The grooved wheel which Bergman
claimed in Universal printer was
in Breguet Electro Magnetic dial
about (1844?)



Make Bonelli's Solution:
Nitrate of Manganese
a light brown colored precipitate.

Paris — wires are run in lead tubes & hung along the Sewers. Some of tubes have only 3 wires. 6 to 8 miles to get out of City.

Prussia uses Regular Submarine Cable to run off of City. Several wires each Cable, 6 miles out. Poles, — Cross arm wires etc nearly like American, Porcelain

French Pole wires close as in England. — No Cross arm.

Frame: Polarized Relay. No Prussia.
Closed Circuit used a little in Prussia.

Prussia Likely to take Automatic.

Feby 5 1874

Manganese & Magnesium decompose water at the boiling point, but will not do it cold (i.e.) the affinity of O for H, is greater when cold than O for Manganese or Magnesium, but the affinity of O for H is lessened by heat & O for Mn & Mg correspdly increased.
Other metals will decompose water at red heat Lowest is Zinc then Iron Chr Co Ni Sn Sp Al Pb Cu last Noble which show no tendency to oxidize in air are incapable of removing O from H & O hence magnesium & Manganese pens. (Mem use hat rolls of reg ferrich)
A fine state of division favors Chemical action hence Calland round Box Zinc or paper or Gutta box filled with a Zinc & packed granulated Zinc & Copper box filled with Copper wire scraps: Get a porous pot about ½ inch thick to fit 1½ Carbon battery Zinc & 1 Carbon to try length time will last - & to prevent the Chemical diffusion of Bichromate from the Carbon pole where it is needed. must to give up an atom of O to the H_2 set free. if Phosphorus exposed in a lump to air dont oxidize so quick but dissolve it in a little Bisulphide of Carbon pour on a paper instantly all oxidizes being in a state of fine division hence I dont believe can prevent from decomposing pen Iron with ferrid ultizis all the O. produced. owing it being in one mass, hence make a pen 64 diameter Composed of a large number of No 40 hard drawn wire covered.

Feby 5. 1874

Get some peroxide of Hydrogen H_2O_2
Sold by Photographic Chemists —

See Blox p. 84 — 85 —

Dissolve ferrid in it in place of H_2O.

Ether & Essential Oil. will dissolve Iodide of Starch. Go for Guaiacum Blox 87.
Look at 87. Note = Blood.

Filter Logwood boiling water solution, through filter having powdered Charcoal
This will decolorize it See if woodland
Quercine has Logwood properties
Bone Black is more powerful

Galvanic means of preparing Barium
Blox 308.
Make Calcium

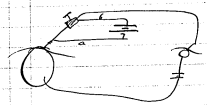
Cerium from prolox & make the
form Red Compounds Blox 32, — 6,

Sol of permang Pot is decomp by a
ferrous salt then red paper made
white by prot - Blox 360.
Good — Mang like iron prolox
immense Coloring powers Mang per
prolox mang — Chl Col in
paper forms xtrody differs black

Feby 5 1874

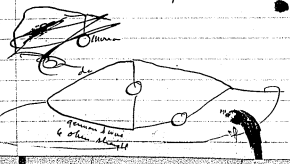
Percip. — Blox 358.

Pure Sal Prun + Tannic A may be mixed without Color but on exposure to the air the prots of the Sul is deoxidized + the tannic Comb forms blk percip hence mix first — plat pen free alon of O. from pen sequeoxidizes prots + produces the Effect =



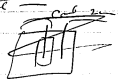
a b current in which is powerful quantity battery. to heat wire thermometer by the current passing through it, this will increase sensitiveness, as chemical action are powerfully increased by heat =

1. Try Induction from a Coreless Bradley Spool of 500 or 600 ohms + then downward to 1 ohm: in bridge Wheatstone Mirror

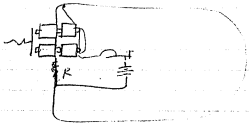


Feby 5 1874

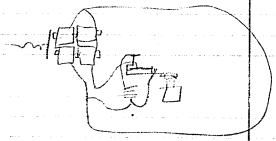
Try Carbon Cup on a decently balling of clean zinc plate both sammarge. Opening no Element top with Mirror also



New Duplex Try it for book



also



Opposite turns black sulph lead into white sulph lead.
Black sulph lead platinum per white mark

New Duplex all right O.K.

* The sentence we took was "Now is the winter of our discontent made glorious summer by the son of York" & all the clouds that lowered upon" with this we got 250 words per minute but counting letters & a word we got 225.

1874 See page 130

Billy Experiment by J A Collins associates

by Chas Bergmann 1870

Feb 9 1873 Experiment tried on repeating at high rates of speed by J A Collins Newark N J

Not being able to repeat more than fifty (50) words per minute through an ordinary relay we constructed one after the following manner.

A is (12) twelve ohm magnet.
B is a (200) two hundred magnet
C is shunt pointed B.
D armature lever & repeat points.

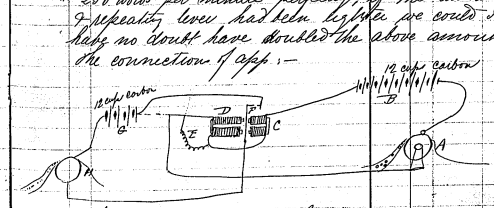
Write away with sperm.

When you close key the magnet A charges instantaneously, but countercurrent from B prevents it from charging instantaneously & when you open the induction current from B works through the shunt C & prevents the bad effects of B going on line.

The resistance in shunt C should be so regulated that the armature will stay on either side in pattern that when the line is kept closed the magnetism is equal on both sides.

With this relay we were enabled to repeat & record on chemically prepared paper at the rate of * 250 words per minute perfectly; if the armature & repeating lever had been lighter we could have no doubt have doubled the above amount.

The connection of app:—

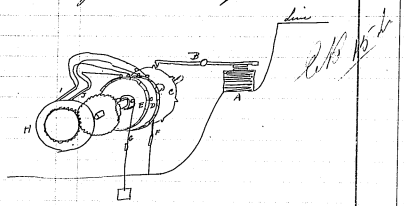


In our experiments the shunt E varied from 10 - 80 ohms

We found that our rollers at A wedged very quickly so much so that at that speed they would have to be cleaned every few thousand yards, which is a defect which we must remedy

1 Wire Roman letter Telegraph. Experiments by T. A. Edison assisted by Chas Batchelor.

Feb. 9. 1874. Having built a machine on the principle set forth by Edison for this extraordinary feat. We proceeded this night to test its qualities.



2 wire Roman Letters

Feb. 10th 1874. Experiment by T. A. Edison assisted by Chas Batchelor

The work to be done was to produce Roman letters using only 2 wires.

The principle of this experiment is to make & break connection 8 or 10 times in the length of a dot on each line & never let them both make connection at the same time. For the purpose we constructed a machine like this. Fig 1

ABCD are four breakwheels with 60 teeth each.

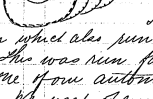
EFGH are breakwheel contact rollers

I is driving pulley

JKLM are the hubs of breakwheels on which also run contact rollers

This was run from the large grooved wheel of the four automatic tables.

We used of course reversed currents which only gives us four pens. Our perforations were made from a perforator that was made for 6 wire & consequently is made 6 dots deep thus

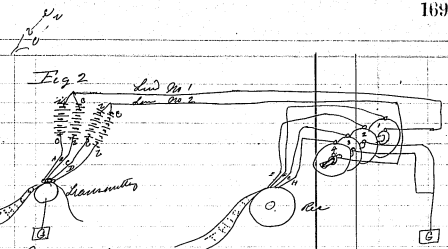


Now as we can only use four pens & having no other perforator we were obliged to use these perforations & cut one line of dots which we did thus.

cutting out the fourth line this made our letters come thus.

MY BOSTON

The breakwheel in fig 1 have got to be set so that the contact rollers E F should not make connection at the same time as the roller G H. The connection for the whole experiment are shown in Fig 2.



As will be seen by Fig 2 if I close on my pen B at transmitting end it sends a positive current to line No 1 which enters breakwheel No 1 at the hub passing through contact roller E pen F (passing through E & pen F) where it makes its mark. If I let go of close on A at transmitting it sends a negative current & one & positive to ground which comes up through Breakwheel 2 & marks on E pen etc.

The same thing is done on line No 2.

The pens at transmitting end are set one ahead of the other on both lines thus as

that one pens is out of a hole when the other is in on each line. The pens at receiving end have to be set the same.

If we run at a high speed say 500 & 600 words we do not get all distinct dots are dropped & others put in owing I think to the 2 rapid reversal of current.

But up to 200 words or under it is all that we could want the letters all coming out perfect samples of which can be seen in Scrap book No

Sw Roc Roman letter Chemical Telegraph

Feb 11, 1874 Experiment by T A Edison acc by Chas Batchelor

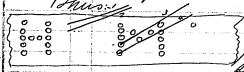
In our last experiment with this subject we noticed that we could gain higher rates of speed if we could do away with such quick reversals of current

The present experiment is for that purpose In this experiment we use reversals but they are of longer duration.

The impressions must be made a little wider apart than the length of widest letter.

Thus the 3rd + 4th pen must be all the width of the largest letter behind the others 1st + 2nd

Thus

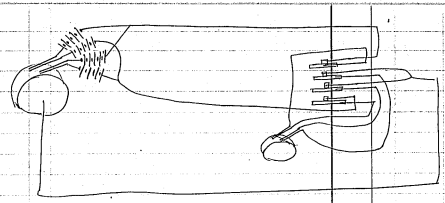


As will be seen the principle of the thing is to send a positive current from 3 + 4 & line Rel + 2 (Page 167) & record it on the 3 + 4 pens for receiving & after they have got across the letter the pens ~~to close the~~ 1 + 2 record their part of letter in same manner.

We can get better results at a higher rate of speed with this, but it necessitates a synchronism, for if the transmitting is sent faster than the receiving the writing will be like this the top half ahead of the bottom

& if transmitting is too slow it will be the other way bottom line ahead of top

Very little practice however will enable a person to keep the letter always straight at the receiving end



Feb 17. Make a secondary battery of one of the large Blue vitriol battery jars & sheet copper thus

2 parallel sheets of copper coiled together close & not apart & may be separated with small pieces of wood each 3 inches & then securely bound together with shoe maline so that two plates cannot possibly touch even with rough handling. I wish to ascertain the amount of charge & discharge this will show on a bridge as well as the length of discharge of satisfaction make 500 volts to be sent thro the line I expect if these bat. are placed on the line 20 miles apart that they will generate from the addition of the transmitting battery as much counter charge as that line & the line that being the case the static charge of the line will be exactly compensated for & any speed or any length of circuit may be obtained

Battery 10.00 Dis 19. 10.00

Make a coil of that gutta percha wire (small) with perfectly insulated joints & coil it on a magnet (ie) two large Relay cores so that it will take up the brass bulk as if Bradley & Porter were used now to insert it in the legs of a battery the current of which passes through the gutta percha wire

Also Wind outside of a Bichromate battery jar with 5 or 6 layers of ordinary relay wire & wish to see if when I close the circuit of the battery there will be induction in the wire

Try this

Comparing the electromotive force of 2 elements:

2 elements are connected in same circ. with a ten. galv. 1st so that their currents go in same direction & 2nd in contrary direction.

Let

Electromotive force be $= E \quad E'$

the R of elements $\quad R \quad R'$

Interpolar resistance $\quad r$

Deflections of sum & indef. is $\quad I_s \quad I_d$

Then

$$I_s = \frac{E+E'}{R+R'+r}$$

$$I_d = \frac{E-E'}{R+R'+r}$$

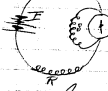
whence $E' = E \cdot \frac{I_s - I_d}{I_s + I_d}$

Try small condensers of alternate sheets of:—

Copper + tinfoil

Tinfoil + tinfoil

To measure a large E.M.F. with a small one:— use a shunt.



~~Battery E — units.~~

Find resistance of Bat 1 & 2.

Find R of galvanometer

take deflection through about 50 ohm

Insert Battery 2 & change shunt till means deflects to same degrees.

Then the equal intensities in galv. are

$$f(\theta) = \frac{E}{(R+r)\left(1+\frac{g}{s}\right)+g}$$

& $$f(\theta) = \frac{E}{(R+r')\left(1+\frac{g}{s'}\right)+g}$$

from which

$$E' = E\,\frac{(R+r)\left(1+\frac{g}{s}\right)+g}{(R+r')\left(1+\frac{g}{s'}\right)+g}$$

Large battery E' compared with small one E, shunt is only used in case of the large one & $s = s'$ may be inserted in above. by which

$$E' = E\,\frac{R+r+g}{(R+r)\left(1+\frac{g}{s}\right)+g}$$

Try this

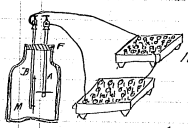
Test resistance of paper strip punched full of dots at all speeds.

Try electromotive force in Pipe 151 page

Charge an insulated secondary battery by first the 8 Bottles by connecting the prime conductor of electrical machine to one end of battery & other prime conductor to other end. Turn for 5 minutes then with insulated key throw battery on an insulated Bradley galvm.

Feb 22 1874

To determine whether any electricity pass from one pole of a battery of 100 elements to the other when separated a slight distance.

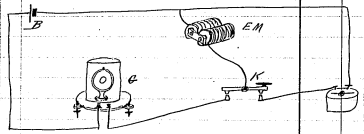


100 cells Porcelain cup battery

M is a clean dry candy jar F is a tight fitting vulcanite & rubber top well secured in jar with plenty of beeswax so that not the slightest trace of air in or out A B are 2 brass rods B has 4 metallic projecting pins in wheel is secured a strip of chemical paper 2 inches long moistened

wild K.I. & starch (grain starch 20g distilled water ½ Litre Tol.)
A is another pot having a platina wire d. facing the lower depole coming within exactly to of an inch. Stay of these two rods project out of the bottle & end in binding posts. The rods should be as far apart as possible. They are connected with 3 stays of the test battery & placed on a table. The tint of any should be noticed & timed as well as the time when the battery is first connected the first tint should be noted & the time taken when it shall have assumed a depth equal to the first tint on the chromatic scale shown in Tree work on Ozone.
Should there be a tint it will prove first that the particles of air are conductors for dynamic & voltaic electricity of low tension & corollary that induction is the effect of conduction the fleeting effect being only produced polarization (ie) an opposing EMF
Secondly that K.I. or any other chemical compound that is decomposible by electricity are very unreliable tests for Ozone. et

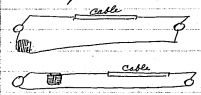
Feb 21. 1874. Perpetual motion or beat the present theories. Thirsty. —



B is a single Daniel cell.
G is a mirror Galvanometer
K is a key with double contact points.
EM is a long electromagnet
GB a Bradley galvanometer in DA 1 coil
Press key down & wait for 5 or 10 seconds then open & close as quick as possible.
If the mirror dont move perceptably & GB does then smash your modern theories.
The magnet must be quite long & lots of fine wire on it otherwise yrs. wire not be able to work the key quick enough to prevent the mirror working, the armature on EM should be permanently fixed so as to increase the induction effect.

Feb 22 1874

Note difference in these two:



first when magnet is placed between instrument & ground & then when it is placed between instrument & cable.

Galvanometer tests on Page 44
Electrical tables & formulas
must this & thoroughly understand it

Mch 18th 1874 Cable.

Experiments on Edisons theory of secondary battery action:—

under the following cond

Distance of scale from Mirror Gal. 22 inches

Resistance of Galv. 2100 ohms

" " Shunt 113 ohms

Lenght of Cable

Battery 105 small cups.

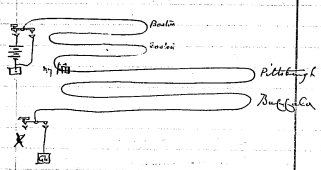
Resistance of battery

(All right

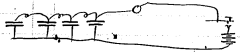
RATO 12 w.

Cable

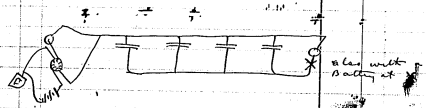
At Western Union.



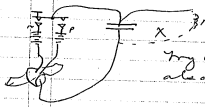
See if Relay closes immediately – whether it closes best with Key open at X to Earth or insulated.



Stop see if there is Earth induction & record from my from Condenser



Put battery on to line & then throw off E & through Receiving instrument

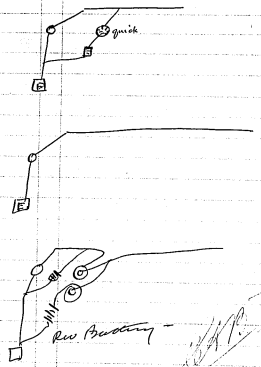


Try what it records. also with X Ckt & Resistance

Remove Current on Cable but keep the receiving instrument – probable that charging distant End will make records record which would not of open

Try.

also replace magnet at X by plain Resistance


quick
E
E
Rw Bending -

Gum Guiac & Aqua Ammonia Water
Chl Sodium Ferrocyanide Pot
Platina pan blue - delicate
Not very permanent

Gum Guiac - H_2O Aqua Ammonia
Copper pan Blue - good
Platina pan fair blue

Gum Guiac H_2O - Chl Sodium Boiled
Magnesium pan Black mark fair
probably very delicate

Gum Guiac H_2O Ammonia "Pi"
Polished Copper & Nickel Blue
first class - platina = both the
Chl Sod - good but slightly
~~[illegible]~~ flakes - Magnesium no
good Iron light Brown - no good

Gum Guiac H_2O Aqua Ammonia
Chl Sod & Nit Pot together nickel brass
good - April 4 all blue
1894 — Elisa

Edisons Force

	Lead pen	Iron base
1 S.K.	Good.	1
2 Ferridcyanide Pot.	1 1/4	
Bitartrate Potash	2.	
Sulphate Potash	3	
Permanganate Potash	3 1/4	
Acid Potassium Tartrate	3	
Nitrate Potash	3 1/2	
Bromide Potassium	3 1/2	
Ferrocyanide Potassium	2 1/4	
Sulphate Iron	1/2	
Ammonia Citrate of Iron	1/4	
Sulphuret Potash	1/2	
Sulphide of Manganese	1/4	
Sulphide of Lead	3	
Boracic Acid	1'	
Salt: Chl. Sodium.	3 1/2	
Sulphuric Acid	O	
Caustic Potash	3 3/4	
Caustic Pot. & Com. HO	2 1/2	

B of B. 22 Ns
Apr 21 1874

Apl. 21 Night. Tried metals as to which was best for testing new face.
Platina on Platina
Lead on Platina
Lead on Iron
The base apparently is indifferent as to which metal is used.
In testing with carbon & rubber a metallic pad we found that there ~~seemed to be~~ very little friction at first when line was closed but soon it became very rough which quickly smoothed down as line opened.
The reverse of this is the case when zinc is the metallic pad.

With 3 thickness of paper on drum it is if anything a little better.

Tried Blue vitriol & Bichromate crystals. Glass & hard rubber to make it fit better by going through it but no go.

Heated metallic rubber no go.

Just got written through 2 ordinary Watch Rheostats 1 large ditto & 1 small ditto with 13 cups Carbon bat.

Minor galv. gave deflec 1° through sum shunted with 200 ohms (Bradley mx)

200 ohm relay ceased to work when 1 of the pockets ran out about 1 min.

Phelps relay 126 ohms repaired at about 2 out of 1 Rheostat.

Tried wet leather on drum (No good)
" H² Rubber & cloth. " "
" Co Wood. " "
" India rubber " "
" Phosphoric Ac. " "
" Card " "
" Gas paper & Hobart. (" ")
" Dry paper " "
" Brown paper " "
" Porous cup " "
" Flour paper " "

May 15 Tests for sensitive solution for Sellinium paper experiment on cable to of Arsenic
Orig. Ferric solution poor tales greatly.
Cyanide Pot found to be pretty sensitive as we used it mixed with the following:
Cyan Pot. Acetate of Manganese. No good.
" " Sugar no good —
" " Sol Citrate Manganese pretty fair
" " " & Salt good ×
" " Citric Acid. slight mark
" " Phosphorus Phosphoric Acid very good +
" " Chromic Acid — no good.
" " Sulph Am. Sal. very good. ×
" " Arsenious Ac slight mark.

May 17 Hydrated Lime seems to be the best solution so far for cables. Sellinium paper

Calling Hydrated Lime	180
" " & Chl. Sodium	110.
" " Ammonia	120
" " Flour & Sugar	80
" " White of Egg	90
" " Amm. & Calf Amm	120
Sulphuret Pot & Salt	50
" " Ammonia Cyan Pot & Chl Sodium Sus solution Marks on both sides	125
" " Iodide Amm.	

Lets 14 h.

May 18. Delicate solutions in Cable
~~Table Condenser.~~
Table Iodide of Potassium out — 100.
Sulphocyanide Pot. Salt,
Hyarate Lime & Ammonia } 105

Decoction Logwood.

½ inch in each bottle. Table spoon of chem.

Nitrate Potash O = St. and Nick. 10000 ohms cells very sensitive. Tin [illegible] & Nick about equal the Fe not so much comes out in air — with Salt. Tin increases delicacy Nick decreased — Hydrogen — Platina fair — Tin — other inferior — Salt in

Pyrogallic Acid — Nickel on O. only.
" Salt. — most all pass
mark on H. Tin slightly on O. best on H. Platina
marks on H. Tellurium best. Plate as good as
Tin —

Citric Acid — None on H or O.
" & Salt — None —

No good marks without battery —

Chloride Mercury. Nickel good on O.
" Copper good on H.
" Salt Tin very sensitive purple —

Acetate Lead — Not good —

Carbonate Pot — Not good — on H. Tin slips
very easy when current on & hard when off.
may be good for chem action
Salt no good —

Benzoic A. H. Platina with Salt — O. Tin
with Salt fair. No good without Salt.

"O"

Sulphocyanide K. Aluminum & Platina white
mark iron fade. very sensitive. Iron pass
blue mark from Copper out in air —
H. no good — Salt "O" Don't improve any

Sulphate of Potassium H platina sensitive
Tellurium exceedingly sensi.
all other pens mark quite sensitive
O. platina bleaches
Tin marks
Tellurium bleaches
Aluminum bleaches
Salt added Zin very sensitive O.
Copper marks comes out in
ebbpowe & air O
Platina sensitive H
Zin very sensitive H
Tellurium very sensitive H no mark.

Hyposulphite of Sodium
H. Platina very sensitive
Zin Muddling sensitive
Tellurium exceedingly "
Copper sensitive
Silver "
Iron "
O. No pen marks

Salt added
H Plat. quite sens
Tin middle "
Tellurium very "
Iron middle "
Lead " "
Zinc " "
all pens marks
O nothing marks

Dilute Nitric Acid
O Nothing marks.
H Strong marks.

Salt added
No good.

Sulphate of Copper.
H Zinc quite sensitive marks appear without
O Zin slightly sensitive

Nitrate Strontia (see next page)
O Platina marks white sensitive
O Zin sensitive purple mark
H Platina black mark not sensitive
H Zin not very sensitive
H Lead not " "
H Copper, Iron, " " Tellurium sensitive

Sodic Phosphate
H No pen marks
O No pen marks.
Salt added.
O No pen marks.
H No pen marks

Nitrate Strontia with salt.
O Zin middling sensitive
H Cadmium " "
H Lead " "
H Iron " "
H Nickel " "
H Platina sensitive
H Zin middling sensitive
H Tellurium very sensitive

Sulphate of Copper with salt
H No pen marks
O Cadmium not very sensitive.

Sulphate Sodium
H Platina middling sensitive
Zinc " " "
O Nothing

Salt added H Platina middling
H Iron "
O No pen marks.

Acetate Sodium.
O No pen marks
H " " "
Salt added
O & H No pen marks

Bichromate of Potash.
O No pen marks
H. " " "
Salt O " " "
H " " "

Acid Potassium Sulfate
O Platina bleaches
O Aluminum "
H Zinc
Salt:- H Iron & Platina inferior mark
O Platina bleaches
O Aluminum bleaches

Sulphuret Potassium
O No good.
H Aluminum bleaches.
Salt added. O Copper very sensitive
it sticks to the paper
O Iron more sensitive than copper
O Nickel very sensitive not so black
as Iron but will probably give better
results as Iron appears to polarize a
little
O Platina bleaches
H Nothing

Ammonium Arsenate
O & H nothing
Salt added.
O & H Nothing

Iodide of Potassium
O Platinum good mark but fades
off on the ear like a generator
Salt added
O Tin inferior
Copper marks when it has
got an oxide on only
H Iron slightly

Potassium Ferrocyanide
H Platina quite sensitive
H Copper not quite so "
Zinc Copper Iron tin not sensitive
O Nothing.
Salt added. O Nothing
H Platina quite delicate
all about same

Sulphate of Mercury.
O ~~Iron~~ no good
H " "

Nitro Prussiate Soda
& and alkaline Sulphide
Intense purple color for a time
In pen mercurized give mercurial
metallic black =

May 24 1874 Plat. Zin Cop. Aluminum

Decoction Bragel Wood

1/2 Decoction 1 teaspoonful of Chemical

10 000 ohms. (3 cells carbon)

1 Pyrogallic Acid
O nothing
H Slightly Platina + Zin
with salt
O Copper fair comes out on exposure
H Platina ~~quite~~ sensitive
Zin middling "
Copper quite "
Lead " "
Zinc " "
Cadmium " "
Iron " "

2 Iodide Potassium
O Platina only
H Platina quite sensitive not quite as sensitive as I.R. but more permanent
Zin sensitive
Silver "
Copper more sensitive
Lead + Zinc sensitive
Salt added
O Zin slight mark + Plat good
H Platina almost as sensitive as I.R., Zin about same
all other gens about as sensitive as each other

Cadmium, Mick, Thallium, Bi. Lead Zinc

3 Bichromate of Potash
O Silver light mark
Cadmium fair
H nothing
Salt.
O nothing
H nothing

4 Sodium Acetate
O Plat. slightly bleaches
Mick. quite sens. comes out in air
Iron " " " " " black
H Zin sensitive
Plat. "
Salt added
O Cop. very sens. comes out in air
The rest about same.
H About same as in O.

5 Acid Potassium Tartrate
O Plat. bleaches very sensitive
Zin " sensitive
They most all bleach
H Plat. red mark
Zin sensitive
Salt added
O Plat bleaches very sens.
Aluminum " extremely sens.
H Lead marks
Cop. marks
Zin sens.
A

6 Sulphocyanide of Potassium
O Plat bleaches extremely sens.
but fades out
Aluminum bleaches about same
Good sensitive comes out black
Zinc bleaches
H No good
Salt added
O Aluminum bleaches very sens
H No good

Potassium Sulphate
O Zinc red marks
Copper quite sens.
Nickel " "
H Platina extra sens.
Zinc " "
Cadmium better
Aluminum + Lead + Copper good
Silver + Iron good.
Salt added
O Zinc slightly
H no better

Potassium Carbonate.
O nothing
H nothing
Salt added.
O Copper is the only one that marks
H Nothing

Benzoic Acid
O Nothing
H Nothing
Salt added
O + H nothing

Potassium Ferrocyanide.
O. Nothing
H Platina black
Zinc "
Nickel pale
Cadmium pale
Aluminum "
Zinc "
Lead "
Salt added
O Acid amount L anything
H Plat sensed
Zinc a little more so.
All metals mark about same

Lead Acetate
O Nothing
H "
Salt added
O + H mix

Citric Acid.
O + H Mix.
Salt added
O + H Mix.

Potassium Nitrate
O Copper quite sens
H Platina sens.
Iron. sens.
Salt added
H Platina sens
Zinc "
Tin "
Tellurium "

Potassium Sulphuret
O + H Nothing
Salt added.
O Iron slight
H Nothing

Sodic Phosphate
Copper quite sens
O Iron " Black mark
O Zin good for Antiprotion by electrolysis
Salt added
O + H Nix

Sodium Hyposulphite
O Nix
H Platina very sens
Zin more so.
Marks on all
Salt added.
H Plat more delicate
~~Decreases delica~~
Increases delicacy of all.

Carbonate of Copper
O + H Nothing
Salt added
O + H Nix

Sodium Sulphate
O Nix
H Platinum slight mark
Salt added
O + H nix

Sulphate Mercury
O nix
H nix
Salt added.
O + H nothing
Zin marks without rubbing

Oil Nitric Acid
O + H nix

Chloride of Ammonium
O + H nix

Arsenate of Ammonium
O nix
H "
Salt added
O + H nix

Nitrate Strontia
O mix
H. mix
Salt added
O mix
H mix

Sulphate Copper
O. lead slight mark
H mix
Salt added
O. no mark on lead.
H mix

Caustic Potash
O & H mix
Salt added.
O & H mix

Aniline Sulphuret
O mix
H mix
Salt added
O Tin faint mark comes better after
H mix

Formic Acid
O. Tin light mark
H mix
Salt added
O & H mix

Phosphoric Acid
O mix
H mix
Salt added
O & H mix

Sulphurous Acid
O. mix
H Tin slight mark
Salt added.
O & H mix Sol Lead.

Hydrarg Nitric oxyd.
O mix
H mix
Salt added & it all solidified

Boric Acid.
O. mix
H mix
Salt added
O Tin light mark
H nothing

Sodium Nitrate
O. mix
H. Blue very delicate
Lud " "
all others " "
Salt added.
O. Tin quite sens.
H. Platina more sens than before
Tin " " " "
Lithium very sens, permanent
all the others more or less sens.

Ferridcyanide of Potassium
O. Iron very slight blue
H. mix
salt added
O. Copper slightly
Lead sens
H. no good.

1874
July 26 Cobalt pass. Sulphide of Ammonium

May 24 1874

Guaiacum dissolved in H_2O
10000 ohms 3 cells.

Pyrogallic acid
O mix
H mix
Acid added
O mix
H Iron yellow hot delicate
Selenium very delicate

Potassium Iodide
O Plat
H Selenium extra sensitive
Acid added
O Platina
H Selenium same

Bichromate of Potash
O Lead & Zinc only
H mix

* All hereafter mix with salt

Lodium Acetate
H Selenium good

Acid Potassium Tartrate
H Selenium only

Potassium Sulphate
H Selenium

Potassium Sulphocyanide
H Selenium

Benzoic Acid
H Selenium only

Potassium Carbonate
H Selenium only

Acetate of Lead
Marsh's Zinc & Nickel
without battery.

Ferrocyanide of Potassium
Nothing

Potassium Nitrate
Mix

Citric Acid Mix

Sodic Phosphate O
H Selenium very sens

Sulphuret Potassium
10 Sou more sen. than Reg Fixed

Carbonate Copper
Rs 900

Sodium Hyposulphite
Rs 900

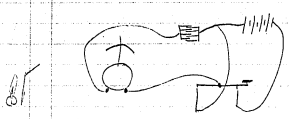
Guaiacum can slide off on
ice car after this Pr. Block to the
contrary notwithstanding.

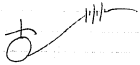
Ex B 60 hr.

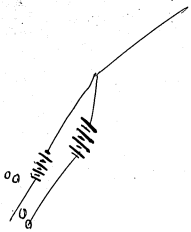
Lest to see how much water is driven
off the Boston albulous paper by the
application of the baking process

Lot 1 of Paper – 480 grains
Baked it for 20 minutes when
it weighed 446¾ grains
which is nearly 7 per cent.
Baked 45 minutes when it weighed 458½ grains
which is nearly $\frac{.044}{1.000}$ a little more than 7 percent.
Baked it 1 hour the last quarter at higher
heat. 444½ grains = $\frac{.076}{1.000}$

Greenish colour with 10 Amm. Ammn. + Sulphide Ion







Christophel Energer
Jean Paul Richter
Paul Twenty Two
Paul Twenty Eight Thousand
Forty Eight Saint
Rose Cy Saint
Paul my
Golden dream
Court

Landed

218

Mr bill are from my little cot
And just are in the cold cold pot
Whether I wanted to or not
My mother —

I tell you what an operator
Is a most mysterious Crathur
With his ~~[illegible]~~ + elegance they dress
But how they do it I Cant guess

If a man who 'cussips' cries
Cries not when his father dies
It is proof that he would rather
Have a cussip than his father

If a man who does not well
To tell another go to hell
His nose gets mashed his eye bunged up
He's rightly served the cursed pup

How nice it is in panic times
To have a pocket full of dimes
I used to know how things myself
But now alas I'm out of pelf

When you owe your Livery stable
and to pay you are not able
obliged to hollk off on your car
I tell you it feels awfully queer

14
48
6 | 5760 | 9⅓
5600
6⅓
3

Methane 14 × 9⅓ = 1279
Hydrogen 1 × 9⅓ = 9⅓
Ox — 16 × 9⅓ 1461
1461
1461

1200 | 57 53 | 2000 | 1500 | 80 | 426

426
31
487
487
487

1461
487
487
426
2861

14
9⅓
1265
1279

16
9⅓
14 40
1461

219

Paul et Virginie
The Loss of Tulips
A Forgotten Rose
Christophal Energer
Sean Paul Richter
Paul Severty Too
Forty Eight Hours
Crow on Saint
Paul my Golden dream song

800
25
4000
6 8 7
7400

Colorado
Scattering 25 | 300
7500

Circumnavigated
Efficacy
The minds meanderings
Phrenological Bonbons
The Seraph of Pan Kan Angel
Left handed Rondeau

Cherokee Phonograph
Photograph of Satan Prior
Lucifer Dante
Hot Air

The Little Acrostic

Photo thro' mormon with Jesus
Where did the bees swarm?
The needle keep pointing northwardly?
(Well I guess it was a bear yourself)

The Dandy
Hells Antechamber

1227

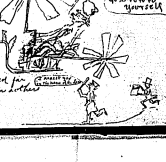
A b man who

33

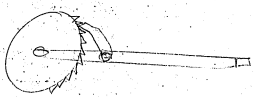
20 = 33

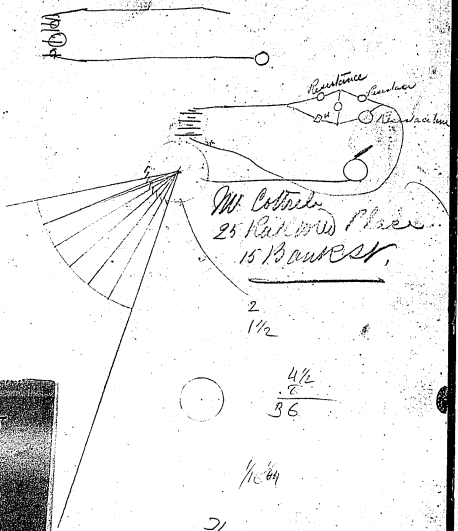
20 | 33 | 1.65
20
1 30
1 20
1 00

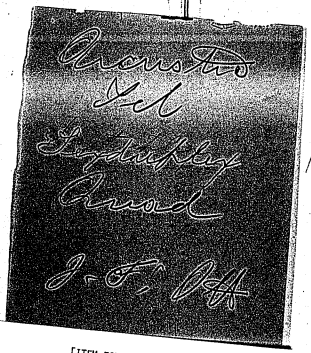
98



J. H. Barnes patent
Flying machines recommended for
Sickly Defaulter clergymen bothers







[ITEM FOUND IN BOOK]